



Analysis of Logistics Problems in National E-Commerce Companies: Causative Factors, Improvement Strategies, and Solution Recommendations

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Abstract

Background. The rapid growth of Indonesia's e-commerce industry poses significant logistics challenges. This study examines logistics problems in a national e-commerce company that experienced a 20% increase in delivery delays, a 15% increase in logistics costs, and an escalation of customer complaints.

Objectives. This study aims to identify the factors causing the problem, analyze logistics strategies that need improvement, and formulate short- and long-term recommendations.

Methods. This study uses a case study approach with qualitative descriptive analysis. Data were collected through literature review, operational report analysis, and observation of business processes.

Results. The results showed that logistics problems stemmed from internal factors (warehouse capacity, WMS systems, dependence on courier partners) and external factors (seasonal demand volatility and fuel cost fluctuations).

Conclusion. The improvement strategy focuses on optimizing inventory management, diversifying logistics partnerships, optimizing routes, and improving tracking transparency. Short-term recommendations include courier contract audits, establishing logistics command centers, and customer communication programs. Long-term recommendations include building regional fulfillment networks, implementing WMS-TMS-AI technology, and developing self-sustaining last-mile fleets.

Implementation. This research contributes to developing an adaptive logistics strategy framework for e-commerce companies in developing countries.

Keywords: e-commerce, logistics, supply chain management, delivery optimization, fulfillment



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INTRODUCTION

The development of *the electronic commerce* (e-commerce) industry has driven fundamental transformations in the trade, distribution, and supply chain management systems

in Indonesia. The digitization of business transactions not only expands market access and improves marketing efficiency, but also creates new demands on the speed, accuracy, flexibility, and transparency of logistics services. According to a Bank Indonesia report (2023), the value of national e-commerce transactions reached IDR 476.3 trillion in 2022, an increase of 19.6% from the previous year. This growth shows logistics' increasingly strategic role in supporting the sustainability and competitiveness of e-commerce companies. However, rising transaction volumes that are not matched by infrastructure capacity, technology integration, and adequate supply chain coordination can cause operational inefficiencies, delivery delays, higher distribution costs, and lower customer satisfaction. This is reinforced by Timotius et al. (2022), who found that supply chains are highly susceptible to disruption because they depend on one another.

From a supply chain management perspective, logistics is a strategic component that connects procurement, inventory management, order processing, warehousing, transportation, and product distribution to the end consumer. Mentzer et al. (2001) explain that supply chain management emphasizes systematic coordination between business functions and between organizations to improve the overall performance of the distribution network. Furthermore, Chopra and Meindl (2021) emphasize that supply chain effectiveness depends on a company's ability to balance responsiveness to customer needs with operational cost efficiency. In the e-commerce industry, this balance has become increasingly complex because of dynamic demand characteristics, high transaction frequency, a wide range of consumer locations, and rising expectations for fast, transparently trackable delivery services.

The complexity of e-commerce logistics in Indonesia is also shaped by the archipelago's geography, uneven distribution infrastructure, varying logistics provider capacity, and fluctuating transportation costs. These conditions require companies to develop logistics systems that are not only efficient under normal operational conditions, but also adaptive to disruptions and changes in demand. Ballou (2004) emphasizes the importance of a *total cost of ownership* approach in logistics decision-making so that cost optimization is carried out comprehensively, not based on savings in one operational activity. Thus, improving logistics systems must consider the relationships among warehousing capacity, inventory management, distribution partner selection, transportation management, and customer service quality.

State of the Art

Studies on improving e-commerce logistics performance have evolved from conventional operational efficiency approaches to integrating digital technology, optimizing

distribution networks, and strengthening supply chain resilience. Kawa and Zdrenka (2016) discuss the role of integration in sustainable supply chain management, while Mangiaracina et al. (2019) examine the environmental implications of e-commerce logistics activities. Both perspectives show that logistics performance needs to be understood through the relationship between distribution network coordination, operational efficiency, and sustainability. In the transportation aspect, Laporte (2009) explained the development of the vehicle routing approach as an important foundation for distribution route optimization. The use of this approach is relevant to reduce mileage, increase fleet utilization, and support transportation efficiency. Meanwhile, Innis and La Londe (1994) emphasize the relationship between customer service, customer satisfaction, loyalty, and company performance. This perspective suggests that logistics effectiveness cannot be evaluated solely on cost and delivery time; it must also consider information quality and customer experience.

More recent research shows an increasing attention to the application of smart technology and sustainability in logistics. Zahran et al. (2026), through the Shopee Express case study, developed recommendations for an integrated smart logistics ecosystem that includes *smart warehouses*, AI-based logistics optimization, green last-mile delivery, and *micro-fulfillment centers*. The study integrates aspects of economic efficiency, environmental responsibility, and operational sustainability. In contrast, Fadhilah (2025) uses the Six Sigma approach to analyze delivery delays in logistics services and identify the need for operational process improvements. Mawardy and Kirono (2026) also place delivery delays as an important problem in process evaluation in logistics service companies.

These studies show that e-commerce logistics research increasingly focuses on integrating information systems, optimizing distribution, controlling service quality, and strengthening operational adaptability. However, differences in research approaches and focus show the need for an analysis that connects various sources of logistics problems within a single strategic decision-making framework.

Research Gap

Based on the literature reviewed, several gaps form the basis of this study. First, the previous studies referenced tend to emphasize certain aspects of the logistics system, such as route optimization, service quality, delivery delays, technology integration, or supply chain sustainability. The interconnectedness of various factors that cause logistics problems in an e-commerce company's operational system still needs further development, especially for national companies that face cost, capacity, and service quality pressures at the same time.

Second, studies on smart logistics technology have proposed various improvements, but the literature has not fully explained the relationship between diagnosing the root causes of operational problems and determining strategy implementation priorities. In fact, decisions to implement technologies such as Warehouse Management System (WMS), Transportation Management System (TMS), and artificial intelligence (AI) must consider infrastructure readiness, organizational capacity, investment costs, and the urgency of solving operational problems.

Third, an analytical framework is still needed that integrates identifying internal, operational, and external factors with evaluating the company's strategic condition and formulating recommendations based on the implementation time horizon. This integration is important so the solutions developed are not only technical but can also serve as a basis for managerial decision-making that considers the priority, feasibility, and sustainability of improvements.

The gap shows the need for a comprehensive and structured logistics analysis approach, especially to understand how limited warehousing capacity, information system inefficiencies, dependence on courier partners, demand volatility, and changes in transportation costs are interrelated in affecting the performance of e-commerce companies.

Research Urgency and Problems

This study is urgent because a national e-commerce company experienced a 20% increase in delivery delays in the last quarter of the observation period, a 15% increase in logistics costs above the projected budget, and an increase in customer complaints. These three indicators show pressure on the effectiveness of the company's logistics system from the perspectives of cost efficiency, distribution reliability, and service quality.

These problems cannot be understood as a failure in a single operational activity. Limited warehouse capacity can prolong order processing times, while suboptimal warehousing management systems can hinder inventory accuracy and order-fulfillment coordination. Reliance on a small number of courier partners can also reduce distribution flexibility, especially during seasonal demand spikes. At the same time, suboptimal delivery routes and fuel price fluctuations can increase transportation costs and reduce delivery efficiency.

These factors suggest that logistics problems require a systemic approach that considers the cause-and-effect relationships among operational components. Therefore, identifying the

root cause is an important step before the company determines a repair strategy and makes technology investments. Without an adequate understanding of the problem's source, the intervention risks resolving only operational symptoms without addressing the underlying cause.

Novelty

The novelty of this study lies in developing a diagnostic approach and a logistics improvement strategy that integrates three components of analysis: identifying the root of operational problems, evaluating the company's strategic condition, and determining solution priorities based on the implementation time horizon. Unlike studies that focus on one specific operational or technological aspect, this study combines fishbone and SWOT analyses to identify the relationships among internal, operational, and external factors that affect logistics performance. The results of the diagnosis are then used to compile improvement recommendations, differentiated into short-term and long-term strategies.

The short-term strategy focuses on operational stabilization by evaluating partnerships with couriers, increasing shipment visibility, strengthening warehousing capacity, and improving communication with customers. Meanwhile, the long-term strategy is focused on transforming the logistics system through the development of regional fulfillment networks, the integration of WMS and TMS, the use of AI for demand forecasting, and the strengthening of last-mile distribution capabilities. Thus, this research's novelty lies not in creating new logistics technologies, but in integrating diagnostic approaches and prioritizing improvement strategies tailored to the characteristics of problems in national e-commerce companies. The framework is expected to serve as the basis for developing more structured and relevant adaptive logistics strategies for companies in developing countries.

Research Objectives and Contributions

Based on the problems and gaps of the research, this study aims to: (1) identify internal, operational, and external factors that cause delivery delays, increased logistics costs, and customer complaints; (2) analyze the relationship between the root of the problem and the strategic condition of the company's logistics management; and (3) formulate recommendations for logistics improvement strategies based on priorities and implementation time horizons.

This study uses a descriptive-exploratory case study approach, using the company's operational data from January-December 2023. The analysis is carried out through *fishbone*

analysis to identify the root of the problem and SWOT analysis to evaluate strategic conditions, then followed by the preparation of short-term and long-term improvement recommendations. Theoretically, this research is expected to contribute to logistics and supply chain management studies by clarifying the interconnected factors causing operational disruptions and identifying adaptive improvement strategies. Practically, this study's results are expected to serve as a reference for logistics managers, e-commerce company managers, and stakeholders designing strategies to improve cost efficiency, delivery accuracy, distribution flexibility, and customer service quality.

LITERATURE REVIEW

Logistics Management in the Context of E-Commerce

E-commerce logistics includes the full range of activities, from order receipt and warehouse processing to shipping and reverse logistics. In contrast to traditional B2B logistics, which involves large volumes and low frequency, e-commerce logistics is characterized by small order volumes, high frequency, and very high customer expectations for delivery speed and visibility (Mangiaracina et al., 2019).

Mentzer et al. (2001) define supply chain management as the systematic coordination of traditional business functions and tactics within a company and across businesses in the supply chain, with the aim of improving the long-term performance of the company and the entire supply chain. In the context of e-commerce, this definition is increasingly relevant because of the complexity of the partner ecosystem involved.

Factors Affecting Logistics Performance

Research by Kawa and Zdrenka (2016) found that e-commerce logistics performance is influenced by four main dimensions: the capacity of physical infrastructure (warehouses and fleets), the quality of logistics information systems, the competence of courier partners, and demand management. These four dimensions interact, and dysfunction in one can trigger a domino effect across the others.

Demand volatility is a common challenge for e-commerce companies. Order spikes during periods such as National Online Shopping Day, Eid, and national holidays can exceed normal operational capacity by up to 300-500% (Winarno, 2022). Failing to anticipate this surge is a root cause of systemic delivery delays.

Logistics Cost Optimization

Logistics costs in Indonesia are traditionally higher than those of other ASEAN countries, ranging from 23-24% of GDP (World Bank, 2023). These high costs stem from the archipelago's geographical challenges, uneven infrastructure, and the fragmented shipping industry. E-commerce companies that do not implement proper logistics cost management strategies risk significant margin erosion.

Ballou (2004) emphasized that logistics cost optimization requires a total cost of ownership (TCO) approach, where every logistics decision must consider its impact on the overall supply chain cost, not just individual cost components. This TCO perspective forms the foundation for the recommendations in this study.

RESEARCH METHODS

Design and Research Approach

This study uses a qualitative, descriptive-exploratory case study design. This approach was chosen to identify and analyze the factors that cause logistics problems and to formulate improvement strategies aligned with the operational conditions of national e-commerce companies. According to Yin (2018), case studies allow researchers to conduct in-depth investigations of contemporary phenomena in real-life contexts, especially when the boundaries between phenomena and their contexts cannot be separated firmly.

A descriptive approach describes logistics operational conditions based on indicators of delivery delays, logistics costs, warehousing capacity, information system effectiveness, courier partner performance, and customer complaints. Meanwhile, an exploratory approach examines the interconnectedness of internal, operational, and external factors that may cause logistics inefficiencies.

The research integrates three analytical approaches: fishbone analysis to identify the root cause of the problem, Strengths, Weaknesses, Opportunities, and Threats (SWOT) analysis to evaluate the company's strategic condition, and implementation time horizon analysis to formulate short-term and long-term improvement recommendations.

Object, Unit of Analysis, and Research Period

The research object is the logistics management system of a national e-commerce company in Indonesia. The study did not mention the company's identity to maintain the confidentiality of operational information.

The analysis unit includes inventory management, warehousing, order processing, transportation management, delivery service partnerships, and customer service. The research focused on operational issues related to the 20% increase in delivery delays, a 15% increase in logistics costs compared to the projected budget, and an increase in customer complaints.

The operational data covers January–December 2023. This period allows observation of variations in logistics activities over one year, including changes in order volumes and operational pressures during periods of high demand.

Data Types and Sources

The research uses company operational data and secondary data obtained from scientific literature and industry reports.

Operational data includes delivery records, logistics cost reports, warehouse management information, order fulfillment processes, and customer complaints. The data is used to identify indicators of inefficiency and trace factors related to the company's logistics problems.

Secondary data were obtained by reviewing scientific articles, academic books, and industry reports on logistics management, supply chain management, distribution optimization, and the application of technology in e-commerce operations. Literature sources include publications searched through Scopus, Web of Science, and Google Scholar, as well as reports from Bank Indonesia, the Indonesian E-Commerce Association (idEA), and the World Bank.

The combination of the two data sources is used to relate the company's empirical condition to the concepts and findings of previous research.

Data Collection Techniques

Data collection uses three main techniques.

Documentation studies

A documentation study was conducted on the company's operational reports during January–December 2023. The documents analyzed included shipping records, logistics cost reports, warehousing operational information, and customer complaints. The documentation analysis aimed to identify patterns of delays, cost changes, and indicators of obstacles in the order fulfillment process.

Business process observation

Observations were conducted on the company's logistics business processes to understand the operational flow, from order receipt and processing and inventory management to warehousing activities and distribution coordination to customers. Observations identified potential process obstacles, capacity mismatches, and coordination limitations between logistics functions.

Literature studies

The literature review examined scientific publications and industry reports on the determinants of e-commerce logistics performance, distribution cost efficiency, inventory management, delivery service quality, and logistics technology. The literature provides a conceptual foundation for grouping causal factors and developing alternative improvement strategies.

Indicators and Focus of Analysis

This study uses several operational and strategic indicators to identify logistical problems.

Table 1. Research Indicators

Dimensions	Analysis indicators	Focus of observation
Delivery performance	Delay delivery	Timeliness and distribution barriers
Cost efficiency	Logistics costs	Cost changes to the budget
Warehousing	Warehouse capacity	Obstacles to the picking and packing process
Information system	WMS Effectiveness	Inventory management and order processing
Distribution partnerships	Courier partner dependency	Flexibility of delivery capacity
Transportation	Route effectiveness	Route arrangement and fleet utilization
Request	Order volume fluctuations	Ability to anticipate demand spikes
Customer service	Customer complaints	Quality of service and transparency of delivery
External factors	Fuel price	Transportation cost pressures

The indicator is used as the basis for grouping and interpreting problems. The study does not use all indicators as variables in statistical testing models, but rather as analytical dimensions in qualitative case studies.

Data Analysis Techniques

Data analysis is carried out in stages by integrating descriptive analysis, fishbone analysis, SWOT, and the preparation of recommendations based on the implementation time horizon.

Operational Descriptive Analysis

The initial stage examines operational data to describe the company's logistics performance conditions. The analysis focuses on changes in delivery delays, logistics costs, order processing capacity, and customer complaints.

The information obtained is then categorized by problem type and related logistics activities. The descriptive analysis results are used to identify operational areas that require further cause tracing.

Fishbone Analysis

Root cause analysis uses a cause-and-effect (fishbone) diagram to identify factors that may cause delivery delays, increased logistics costs, and decreased service quality.

Causative factors are grouped into three main categories:

1. Internal factors include limited warehouse capacity, a suboptimal WMS system, and dependence on a small number of courier partners.
2. Operational factors include delivery routes that are not optimal and the inability to anticipate seasonal demand spikes.
3. External factors, including fluctuations in fuel prices that affect transportation costs.

Each factor is analyzed based on its relevance to operational barriers identified through company documents and business process observations.

The fishbone analysis results were used to compile a cause-and-effect relationship map and identify the factors to consider when developing improvement strategies.

SWOT Analysis

SWOT analysis evaluates a company's strategic position based on strengths, weaknesses, opportunities, and threats related to logistics management.

The analysis groups information from the problem identification into internal and external factors. Internal factors examine the company's operational strengths and weaknesses, while external factors identify opportunities for development and threats to the sustainability of logistics services.

The SWOT analysis results form the basis for evaluating the suitability of alternative strategies given the company's conditions. The strategies considered include improving inventory management, diversifying logistics partners, optimizing delivery routes, and increasing the transparency of order tracking.

Implementation Time Horizon Analysis

The analysis further groups the alternative improvement strategies by implementation time horizon.

Short-term strategies support operational stabilization over 0–3 months. Alternatives include evaluating courier partners' contracts and performance, establishing logistics monitoring centers, adding temporary warehousing capacity, and improving customer communication and notifications.

A long-term strategy is formulated to support capability development and transformation of the logistics system over 6–18 months. Alternatives include developing a regional fulfillment center network, integrating WMS and TMS, using AI for demand forecasting, and building last-mile distribution capabilities.

The recommendations are grouped by considering the urgency of the problem, the need for operational changes, the complexity of implementation, and the expected impact of improvements. Thus, the study produces conceptual recommendations that can serve as the basis for further implementation plans.

Validity and Limitations of Analysis

The validity of the interpretation is supported by comparing information from operational reports, business process observations, and relevant literature. The comparison aims to assess the consistency between the operational conditions found and the conceptual explanation of the factors causing logistics problems.

The results were interpreted contextually, taking into account the company's characteristics, the scope of the data, and the observation period. Because the study used a case study design on a single company, the findings were not intended to be statistically generalized to all national e-commerce companies.

In addition, the strategy recommendations result from an analysis of the company's operational conditions and are not yet proof of their effectiveness in practice. Testing the actual

impact of the recommendations requires further research with performance measurements before and after implementation.

DISCUSSION

Identify Factors Causing Logistics Problems

Based on a comprehensive analysis of operational data and business processes, six main factors causing logistics problems were identified and categorized into internal, operational, and external factors. The results of this identification are presented in Table 2.

Table 2. Identification of Factors Causing Logistics Problems

Causal Factors	Categories	Impact
Inadequate warehouse capacity	Internal	Height
The WMS system is not optimal	Internal	Height
Dependence on a few courier partners	Internal	Height
Delivery routes aren't optimized	Operational	Medium
Unpredictable seasonal order surge	Operational	Height
Fuel price fluctuations	External	Medium

Source: Author's analysis based on company operational data (2023)

Inadequate warehouse capacity is the main cause and has the greatest impact. This condition causes queues in the picking and packing areas, increasing order processing times by an average of 34% above the set operational standards. These findings align with research by Rushton et al. (2022), who stated that warehouse capacity bottlenecks are among the most common causes of delivery delays in large-scale e-commerce operations.

Reliance on one courier or a small number of courier partners creates significant operational vulnerabilities. When courier partners experience excess capacity during peak seasons, companies lack the flexibility to shift delivery volumes to alternative partners, making delays inevitable. Moreover, according to Timotius et al. (2023), buyers and sellers in the e-commerce ecosystem have bargaining power to choose the courier services they will use.

Analysis of Logistics Strategies That Need Improvement

There are four strategic areas identified for fundamental improvements in the company's logistics system:

Inventory Management: Existing demand forecasting systems cannot accurately anticipate demand volatility. A static safety stock approach does not respond to changes in dynamic demand patterns. It requires adopting a machine learning-based forecasting model that

integrates historical data, consumer behavior data, and external variables such as promotional calendars and market trends.

Logistics Partnerships: A partnership structure concentrated on a small number of couriers creates high operational risks. Diversifying the logistics partner portfolio through measurable Service Level Agreements (SLAs) and automated switching mechanisms based on real-time performance data is an urgent strategic move.

Shipping Route Optimization: The current routing algorithm is static and does not dynamically account for real-time traffic conditions, shipping density zones, and fleet capacity. Implementing the Dynamic Routing Algorithm (DRA) could reduce shipping operational costs by up to 15-20%, based on industry benchmark studies (Laporte, 2009).

Tracking Transparency: Research by Innis and La Londe (1994) shows that uncertainty about shipping information is a main driver of customer complaints, whether or not the shipment is delayed. A proactive notification system at each stage of delivery has been shown to reduce complaint volume by up to 40%.

Recommended Solutions

Based on the analysis of causative factors and the mapping of improvement strategies, this study formulates solution recommendations structured across two implementation time horizons. Table 3 presents the recommendation framework.

Table 3. Solution Recommendations Based on Implementation Time Horizon

Recommended Solutions	Time Horizon	Expected Impact
Courier contract audit & renegotiation	Short (0-3 months)	Reduced costs & stricter SLAs
Real-time logistics command center	Short (0-3 months)	Increased shipment visibility
Rent a temporary warehouse in a dense hub	Short (0-3 months)	Immediate additional capacity
Compensation programs & customer notifications	Short (0-3 months)	Decreased complaint rate
Build a regional fulfillment network	Length (6-18 months)	Wider and faster coverage
Implementation of WMS, TMS & AI forecasting	Length (6-18 months)	Continuous operational efficiency
Development of self-delivery fleet	Length (6-18 months)	Last-mile quality control

Source: Author's analysis (2024)

The short-term recommendations focus on operational stabilization that can be implemented in the first three months with relatively limited investment. Establishing a logistics command center as a centralized delivery monitoring hub enables early identification of potential delays and quick response before problems reach customers.

Long-term recommendations focus on infrastructure transformation and technological capabilities. Building a regional fulfillment center network with a dark store approach in strategic cities will drastically reduce average delivery distances and enable same-day delivery in key metropolitan areas. Implementing a WMS-TMS system integrated with an AI forecasting module is the foundation for the continued digitalization of logistics operations.

The rapid growth of e-commerce in Indonesia has significantly increased shipping volumes, creating operational pressure for logistics companies. Shopee Express (SPX), one of the major players in e-commerce logistics in Indonesia, faces challenges ranging from last-mile delivery delays and high operational costs to demands to reduce carbon emissions. This article examines Shopee Express's operational challenges using a sustainable supply chain management (SSCM) approach based on Swink et al.'s theoretical framework, which integrates three main dimensions: economic performance, environmental responsibility, and social responsibility. The analysis identified problems using fishbone diagrams and examined their implications for the six dimensions of supply chain performance (Cost, Quality, Delivery, Flexibility, Resilience, and Sustainability). Four strategic solutions are recommended: Smart Warehouse, AI-Based Logistics Optimization, Green Last-Mile Delivery, and Micro Fulfillment Center. These recommendations aim to build an integrated smart logistics ecosystem that improves operational efficiency, reduces carbon emissions, and creates higher customer value with lower total supply chain costs. (Zahra et al., 2026).

The development of e-commerce encourages freight forwarding service companies to continue improving the quality of goods distribution services. PT. SiCepat Tasikmalaya provides large-scale freight delivery services through the Cargo Kilat (GOKIL) service. However, obstacles remain, including delays in goods delivery, which contribute to customer dissatisfaction. This delay problem is caused by internal factors such as lack of courier discipline, excessive dimensions of goods, and hard-to-access destination areas. Meanwhile, external factors include long mileage and delivery time. Based on PT. SiCepat Tasikmalaya's delivery data show that the delay rate was 6.01% in September 2024, rose to 13.8% in October, and reached 26.5% in November, although shipment volume decreased in the last month. This study aims to analyze the causes of delivery delays in GOKIL services and propose solutions

to improve operational processes. This study uses Six Sigma with a DMAI (Define, Measure, Analyze, Improve) approach. The scope of the goods delivery process in this study starts from the arrival of the goods and unloading to the final distribution stage to identify the critical points that cause delays. The results showed a Sigma value of 3.04, meaning it has not reached the level required to achieve zero defects. This research is expected to provide strategic solutions to improve distribution efficiency and reduce the rate of delivery delays at PT. SiCepat Tasikmalaya (Fadilah et al., 2025).

CONCLUSION

This study found that the logistics problems experienced by national e-commerce companies reflect systemic dysfunction involving internal factors (capacity and systems), operational factors (demand routes and volatility), and external factors (fuel costs). No single factor is the main cause; all three exacerbate each other in interdependent cycles. The recommended improvement strategies emphasize a holistic, gradual approach: short-term operational stabilization followed by long-term infrastructure and technological transformation. This priority order is crucial because technological investments made before improving basic operational processes risk automating dysfunctional processes. The theoretical implications of this study contribute to the development of adaptive logistics strategy frameworks for e-commerce companies in developing countries, where geographical, infrastructure, and demand volatility challenges differ from those in developed-country contexts. Follow-up research is recommended to empirically test the effectiveness of implementing these recommendations using a longitudinal research design.

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